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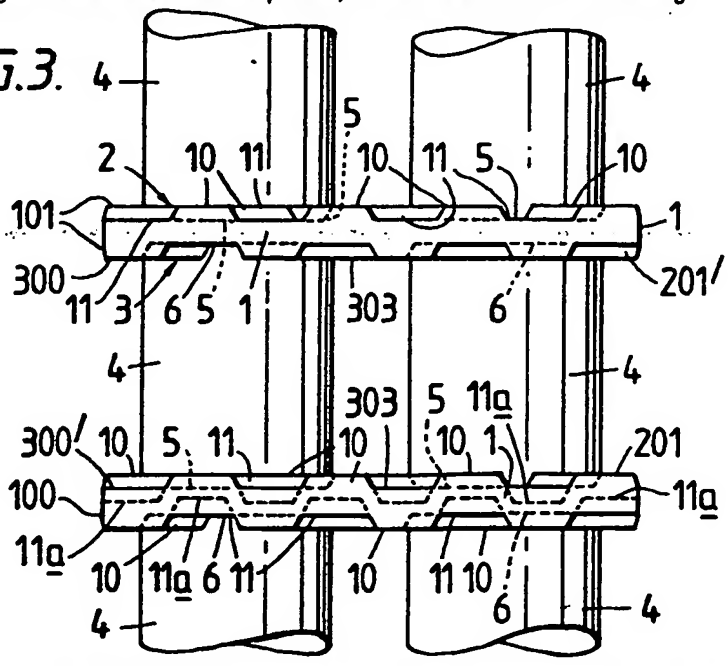
(54) **Flat pallet spacer element**

(57) A spacer element, e.g. of moulded plastics, for location between similar overlying articles, e.g. beer kegs 4, in a stack to provide horizontal stability to the stack has a horizontal deck 1 and seatings 5 on one side on which an upper article 4 in the stack is to stand and seatings 6 on the opposite side which are to rest on lower articles 4 in the stack. The seatings 5 and 6 are formed by projections 10 and recesses 11 on the deck which are arranged so that two similar elements can be stacked in directly overlying and abutting relationship with the downwardly extending projections of the upper element engaging in corresponding recesses of the lower element and upwardly extending projections of the lower element engaging in corresponding recesses of the upper element so that said engagement provides horizontal stability in the stack of elements. The projections are preferably inclined at 45° to two central axes of the element and arranged so that two similar elements can be stacked together either way up and in any one of the four rotational positions between two elements where the peripheral side edges of the two elements are parallel, so as to minimise effort in stacking.

FIG.3.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

GB 2 224 993 A

FIG. 1.

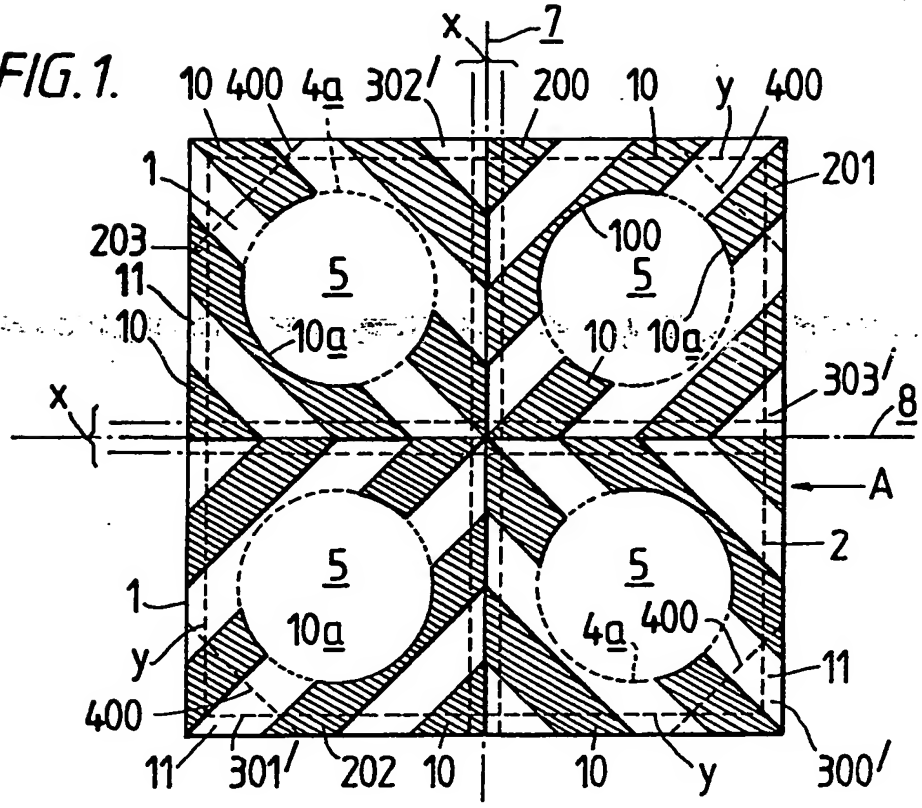

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FIG. 2.

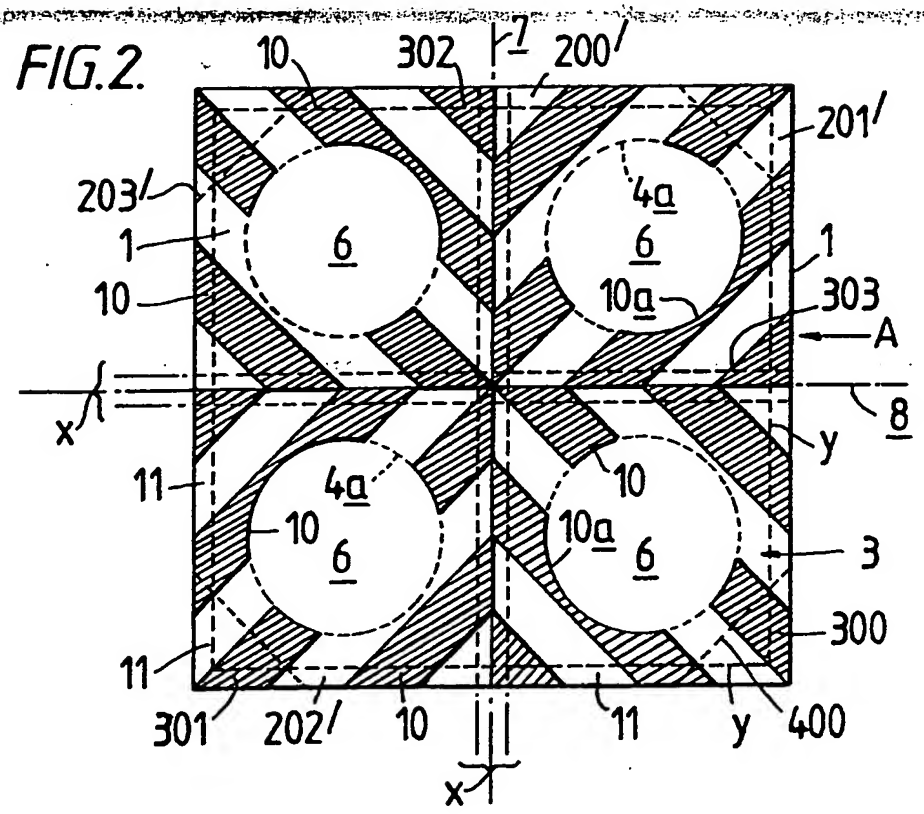
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FIG.3.

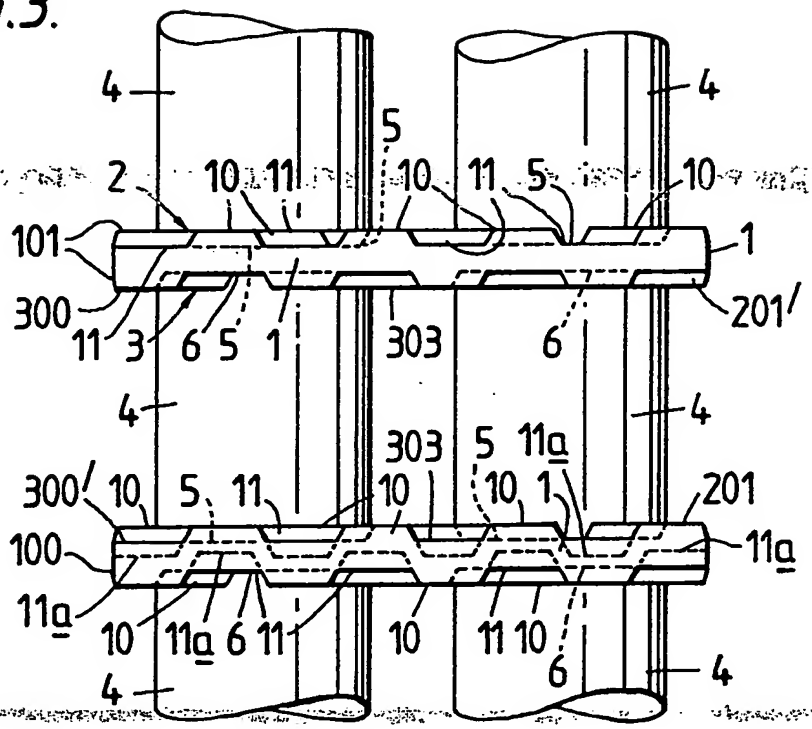
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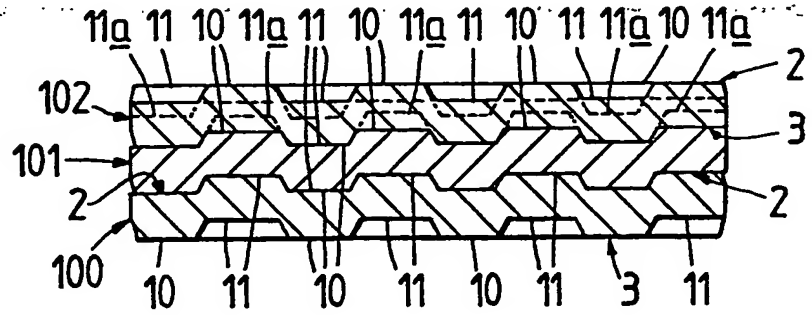
FIG.4.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2
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11

TITLE

"A spacer element"

TECHNICAL FIELD & BACKGROUND ART

The present invention relates to a spacer element and is particularly concerned with elements that are intended to be located between similar overlying articles in a vertical stack of such articles to provide horizontal stability to the stack. Such elements are well known for providing stability in a stack of articles during their storage or transport. Conventionally the elements have top and bottom seatings which are arranged so that during erection of a stack one element is located on a bottom layer of articles with the tops of the articles in that layer being accommodated in the bottom seatings of the element, a second layer of articles is then located to stand on the one element with the base of those articles accommodated in the top seatings of the one element, and a further element is then located on the tops of the articles in the second layer so that those tops are accommodated within the bottom seatings of the further element. In this manner a vertical stack with alternating layers of articles and spacer elements is successively erected so that the engagement between seatings and articles restrain the elements from horizontal displacement relative to the articles. Typically, the articles will be in the form of container drums, kegs or casks of circular section and flat ended and such containers will stand with their flat ends accommodated in circular seatings - the present invention was primarily developed for use in the storage and transportation of beer casks and similar containers although it will be appreciated that it may readily be applied for use with other articles.

While spacer elements of the type referred to provide horizontal stability in a stack of articles, it is often necessary to transport or store several spacer elements

when they are not used for their intended purpose. For convenience of such transport or storage several spacer elements will usually be assembled as a vertical stack in directly overlying and abutting relationship. However, experience has shown that when a vertical stack is formed solely from spacer elements of known type the stack has very poor horizontal stability in so far as the spacer elements tend to slide over each other with the undesirable consequence that the stack may fall over, particularly during transportation. It is therefore an object of the present invention to provide a spacer element which is arranged so that several similar such elements can be stacked vertically in overlying and abutting relationship in a convenient and simple manner and also in a manner which provides horizontal stability between adjacent abutting elements in the stack.

STATEMENT OF INVENTION & ADVANTAGES

According to the present invention there is provided a spacer element for location between similar overlying articles in a vertical stack of such articles to provide horizontal stability to the stack and comprising a substantially flat horizontal deck having one side on which an upper article in the stack is to stand and an opposite side which is to rest on a lower article in the stack; wall means extending upwardly and downwardly relative to the one side and the opposite side of the deck respectively to determine seatings within which the said upper and lower articles are to be received in directly overlying relationship to restrain the element from horizontal displacement relative to those articles, said wall means comprising an array of projections and recesses with a projection on the one side having a substantially corresponding recess vertically underlying it on the opposite side and a recess on the one side having a substantially corresponding projection vertically

underlying it on the opposite side, said projections and recesses being arranged such that the element can be used to provide said horizontal stability in a stack of articles with either the one side or the opposite side of the element directed upwardly and, in the absence of articles, two similar elements can be stacked in directly overlying and abutting relationship with downwardly extending projections of the upper element engaging in corresponding recesses of the lower element and upwardly extending projections of the lower element engaging in corresponding recesses of the upper element and said engagement restrains the two elements from horizontal displacement relative to each other.

The present invention provides the advantage that the engaging recesses and projections in a stack formed solely by similar spacer elements will restrain those elements from sliding horizontally relative to each other to ensure that the stack maintains stability. It is a preferred feature of the invention that the projections and recesses are arranged so that two similar elements can stack in directly overlying and abutting relationship with projections and recesses of the two elements inter-engaging and with each of those elements having its one side directed optionally upwardly or downwardly. By this preferred feature it will be apparent that during the formation of a stack of the elements it is unnecessary to determine which way up a particular element has to be placed on the stack to ensure inter-engagement with the underlying element that it abuts - this is particularly convenient bearing in mind that the elements tend to be treated quite harshly during stacking in so far as they are likely to be thrown on top of each other and the person forming the stack is unlikely to have either the time or inclination to determine whether a particular element has either its one side or its opposite side directed upwardly

tc ensure stack stability.

Having in mind that handlers of the spacer elements are likely to form a stack of the elements with scant regard for the orientation of each element as it is applied to the stack save that the elements are in directly overlying relationship, it is a further preferred feature of the invention that the element has two central axes in the plane of the deck that are substantially perpendicular relative to each other and each central axis notionally divides the element in half and the projections and recesses of the wall means are arranged so that two similar elements will stack in directly overlying and abutting relationship with either central axis of the upper element being parallel and directly overlying either one of the two central axes of the lower element. This latter desirable characteristic may be achieved by arranging for the projections and recesses of the said one side on a first half of the element as determined by either central axis as selected to be substantially identical in form and disposition to the projections and recesses of the said opposite side on the other half of the element as determined by the selected central axis. Consequently, several similar spacer elements each having the aforementioned preferred features may be stacked vertically in directly abutting and overlying relationship with each element in the stack having, optionally, either its one side or its opposite side directed upwardly and either one of its two central axes directly overlying and parallel with either of the two central axes of the underlying element. The handler of the elements can therefore erect a stable stack with many permissible combinations for orientation between the elements so that negligible thought has to be given to the stack structure.

Preferably the projections and recesses of the wall means are disposed to extend over the element along

notional lines at substantially 45° relative to the aforementioned central axes.

Usually the spacer element will have a generally rectangular profile in plan with the projections and recesses being arranged so that two similar elements stack in directly overlying and abutting relationship with the respective projections and recesses engaging between the two elements when the four peripheral side edges of the upper element directly overlie and are parallel to the four peripheral side edges of the lower element. Such a rectangular profile may be oblong but it is preferred that the profile is square. With rectangularly profiled elements it is also preferred that one of the aforementioned central axes is parallel with a peripheral side edge of the element. It is to be realised however that the present invention is applicable to spacer elements having a profile which is other than rectangular, for example the invention may be applied to elements having an oval, hexagonal or other shape as convenient since the peripheral profile presented by the element in plan may merely serve as a convenient means for ensuring the correct relationship and orientation between the central axes of overlying elements for thos elements to inter-engage as previously discussed; for example it would be possible for the spacer element to be provided with a circular peripheral profile although this may not prove entirely convenient since in achieving a stack of similar elements it would be necessary, without having an indicator (such as an appropriate marking on the element), to rotate one element relative to another until the projections and recesses of adjacent overlying elements drop into engagement.

The spacer element is preferably formed as a one piece plastics moulding and as is usual for such mouldings it may be of an open framework structure to conserve material.

Similarly the projections can be of a skeletal or multi-ribbed form. Usually each projection will be slightly tapered for its width to decrease as it recedes from the deck while each recess has a corresponding taper to decrease in width as the depth of the recess increases so that the respective projections and recesses of adjacent elements will smoothly inter-engage. Such tapering is also convenient to facilitate removal of a plastics element from its mould.

It will be apparent that the spacer element can be provided with any number of corresponding seatings on its one and opposite sides. These seatings can be of any shape on the deck and will usually be disposed symmetrically with respect to each of the aforementioned two central axes.

DRAWINGS

One embodiment of a spacer element constructed in accordance with the present invention will now be described, by way of example only, with reference to the accompanying illustrative drawings in which:-

Figure 1 is a top plan view of the element illustrating the array and disposition of seatings, projections and recesses on one side of the element;

Figure 2 is a further top plan view of the element disposed similarly to that shown in Figure 1 and illustrating the array and disposition of seatings, projections and recesses on the opposite side of the element;

Figure 3 is a side elevation of a vertical stack formed by cylindrical drums and two similar spacer elements each as shown in Figures 1 and 2 with the spacer elements being viewed in the direction of arrow A in Figures 1 and 2, and

Figure 4 is a side elevation of a vertical stack of three similar spacer elements each being as shown in

Figures 1 and 2.

DETAILED DESCRIPTION OF DRAWINGS

The spacer element is injection moulded in plastics material as a single unit and has a substantially flat deck 1 which, in use, will be horizontal and will be considered as such for convenience of reference. One side 2 of the deck 1 is shown in Figure 1 and the opposite side 3 of the deck is shown in Figure 2. The spacer element is intended for location between overlying substantially flat ended cylindrical containers such as beer casks 4 (see Figure 3) in the formation of a vertical stack of such containers and for this purpose the one side 2 of the element is provided with seatings 5 and the opposite side 3 is provided with seatings 6. In the present example several of the elements are to be used in the vertical stacking of layers of containers 4 with four similar containers in each layer. Accordingly each of the one and opposite sides of the element has four generally circular seatings 5 and 6 within each of which either the top or bottom end of a container 4 is to be accommodated. In Figures 1 and 2 the positioning of the end of a container in a seating 5 or 6 is shown at 4a which is partly defined by part circular plastics walls extending from the deck 1 of the element while the remaining outline of the container on the deck is shown by the broken line. The element has a square profile in plan with central axes 7 and 8 (see Figures 1 and 2) which are located in the plane of the deck 1 and extend perpendicularly relative to each other. Each axis 7 and 8 notionally divides the container in half and is parallel to a peripheral side edge of the element. It will be seen from Figures 1 and 2 that the seatings 5 and 6 are symmetrically disposed on each side of the two axes. Furthermore, the seatings 5 are in directly overlying relationship with the seatings 6.

A vertical stack of containers 4 is assembled as shown

in Figure 3 by locating a spacer element on a floor with its deck 1 horizontal and either its one or opposite side directed upwardly. Four containers 4 of a first layer are now positioned with their circular bottom ends standing in the upper seatings on that element. A second element 100 (Figure 3) is positioned on the four containers so that the top circular ends of the containers are located within the seatings 5 or 6 of the element 100 (depending upon which side of that element is uppermost). A further four containers for a second layer are now positioned with their circular bottom ends in upwardly directed seatings on the element 100 and another element 101 is fitted to the top ends of those further containers. The vertical stack is erected with successive layers of containers and elements so that the containers effectively present four cylindrical vertical columns over the height of the stack. In each case the seatings 5 and 6 of the spacer elements (100 and 101) restrain those elements and the containers from horizontal displacement relative to each other and thereby maintain a stable stack.

When the spacer elements are not required for use in forming a stack of containers as aforementioned, those elements may themselves be stacked in vertically overlying and abutting relationship for convenience of storage and transportation. The structure of the spacer element will now be considered with a view to providing convenient and stable stacking of several such elements.

Referring again to Figures 1 and 2, each of the one and opposite sides 2 and 3 of the deck 1 has an array of projections in the form of ribs 10 which are shown heavily shaded in Figures 1 and 2. Formed between the ribs 10 and deck 1 on each of the one and opposite sides of the element are recesses in the form of shallow channels 11. The ribs 10 and channels 11 present a spaced array on each of the one and opposite sides 2 and 3 respectively of the deck

and these ribs and channels are disposed to extend over the deck along notional lines which are at 45° with respect to the central axes 7 and 8. It will also be seen that the ribs 10 do not enter the seatings 5 and 6 and, where appropriate are provided with an arcuate profile (indicated at 10a) to partly define those seatings. Furthermore, some of the channels 11 have ends which open into the seatings 5 and 6 (it is for this reason that the seatings have partly been indicated by the broken lines 4a). It will be realised however that the seatings 5 and 6 may be deeper than the channels 11 in which case there may be a shoulder formed between the floor of each channel and the deck which forms the seatings 5 and 6 and these seatings may then be defined by a continuous circular wall of the shoulder. In the present example the abutment of the ends of the containers 4 against the ribs 10 (particularly the profiled portions 10a of the ribs) will restrain the containers 4 in a vertical stack from displacement horizontally relative to the spacer elements.

By comparison between the darkly shaded ribs 10 and the unshaded channels 11 in each of the one and opposite sides shown in Figures 1 and 2 it will be seen that for each rib 10 on the one side 2 there is a corresponding channel 11 vertically underlying it on the opposite side 3 and for each channel 11 on the one side 2 there is a substantially corresponding rib 10 vertically underlying it on the opposite side 3. Consequently, and for comparative example, the ribs 200, 201, 202 and 203 on the one side 2 have respectively corresponding directly underlying channels 200', 201', 202' and 203' on the opposite side 3 and the ribs 300, 301, 302 and 303 on the opposite side 3 have directly overlying channels 300' to 303' respectively on the one side 2.

Furthermore, the ribs 10 and channels 11 of the one side 2 which are disposed on one and either half of that

one side (as determined by either central axis 7 or 8 as selected) are substantially identical in form and disposition as the ribs 10 and channels 11 which are located on the opposite side 3 of the element and which are in the other half of that opposite side as determined by the selected central axis. This may best be appreciated by comparing the top half of the element in Figure 1 with the bottom half of the element in Figure 2 where it will be seen that these portions are the mirror image of each other; similarly, the righthand half of the element in Figure 1 is the mirror image of the lefthand half of the element shown in Figure 2.

With the ribs and channels arranged as above described, when two similar spacer elements are stacked vertically in directly overlying and abutting relationship, the downwardly extending ribs 10 of the upper element will engage in the respectively corresponding channels 11 of the lower element while the upwardly extending ribs of the lower element will engage in corresponding channels 11 of the upper element. For example with a bottom element disposed so that its one side 2 is directly upwardly then a channel 302' of that one side will accommodate a projection 302 which is presented from the opposite side of the upper element while a projection 201 extending upwardly from the one side of the bottom element will be received in a channel 201' of the upper element. When the stacked elements engage as aforementioned, the side edges of the square profiles will be in directly overlying and parallel relationship which is most convenient for a person handling the elements to ensure that the ribs and channels are appropriately aligned for inter-engagement.

Furthermore, from the respective patterns of channels and ribs on the one and opposite sides 2 and 3 it will be appreciated that the aforementioned inter-engagement between two abutting elements can be achieved in any one of

the four positions in which the upper container can be orientated by rotation (through 90° increments) in its in horizontal plane relative to the lower container whilst ensuring that the four edges are in overlying and parallel relationship.

Still further the aforementioned inter-engagement between two directly overlying and abutting elements can be achieved irrespective of whether the underlying element has either its one side or opposite side directed upwardly and of whether the overlying element has either its one side or opposite side directed downwardly. This can possibly best be appreciated bearing in mind that the one side of the element shown in Figure 1 from any one of its peripheral edges is the mirror image of the opposite side of the element as shown in Figure 2 from any one of its peripheral edges.

As a consequence of the ribs and channels being arranged as above described and illustrated it will be apparent that several spacer elements such as the three shown at 100, 101 and 102 in Figure 4 can be stacked with their decks horizontal and in directly overlying and abutting relationship and with each element in the stack having either its one side or opposite side directed upwardly and having any one of its four peripheral edges overlying (or underlying) any one of the four peripheral edges of another element. Consequently, provided that the elements directly overlie each other they will automatically inter-engage when stacked together and the co-operating ribs and channels will provide stability to the stack in so far as the elements are restrained from horizontal displacement relative to each other.

Preferably the ribs 10 and channels 11 are slightly tapered as shown in Figure 4 so that the width of each rib decreases as its height increases and the width of each channel decreases as its depth increases; such tapering

may facilitate engagement between the respective ribs and recesses during stacking and also removal of the plastics element from its moulding tool.

To conserve plastics material it is unlikely in practice that the ribs 10 will extend over the element to the extent shown in Figures 1 and 2; for example, part length of the ribs may be omitted within the lines indicated by the arrows X in Figures 1 and 2 and also at the marginal edge parts of the one and opposite sides as indicated by the lines Y in those Figures without detracting from the desirable characteristics of the spacer element. Again without detracting from the stacking characteristics and to conserve material, the corners of the rectangular element can be removed (as indicated along the lines 400) to provide an octagonal peripheral profile. Also the channels 11 may be deeper (as indicated at 11a on the element 100 in Figure 3 and the element 102 in Figure 4) than that previously indicated so that the bottoms of the channels lie below the deck on each side of the element. The ribs and deck will often be of an open framework structure.

Although the spacer element as above described and illustrated is intended for stacking four containers in a layer, it will be appreciated that the pattern of ribs 10 and channels 11 can be modified to accommodate any number of seatings which are suitably symmetrically disposed about the central axes 7 and 8. Furthermore, the spacer element shown in Figures 1 and 2 may be regarded as a module on the basis of which a multi modular element can be constricted to form, for example, a spacer element having an oblong rectangular profile comprising two modular patterns presenting eight seatings on each side of the element or a larger square profile can be formed comprising four modular patterns which present sixteen seatings on each side of the element.

It will be realised that the peripheral profile of the seatings 5 and 6 can be other than circular and will be formed as appropriate to accommodate the articles which are to be stacked.

CLAIMS

1. A spacer element for location between similar overlying articles in a vertical stack of such articles to provide horizontal stability to the stack and comprising a substantially flat horizontal deck having one side on which an upper article in the stack is to stand and an opposite side which is to rest on a lower article in the stack; wall means extending upwardly and downwardly relative to the one side and the opposite side of the deck respectively to determine seatings within which the said upper and lower articles are to be received in directly overlying relationship to restrain the element from horizontal displacement relative to those articles, said wall means comprising an array of projections and recesses with a projection on the one side having a substantially corresponding recess vertically underlying it on the opposite side and a recess on the one side having a substantially corresponding projection vertically underlying it on the opposite side, said projections and recesses being arranged such that the element can be used to provide said horizontal stability in a stack or articles with either the one side or the opposite side of the element directed upwardly and, in the absence of articles, two similar elements can be stacked in directly overlying and abutting relationship with downwardly extending projections of the upper element engaging in corresponding recesses of the lower element and upwardly extending projections of the lower element engaging in corresponding recesses of the upper element and said engagement restrains the two elements from horizontal displacement relative to each other.

2. An element as claimed in claim 1 and which is arranged so that with two similar elements stacked in directly overlying and abutting relationship, said projections and recesses of the two elements inter-engage with each of

those elements having its one side directed optionally upwardly or downwardly.

3. An element as claimed in either claim 1 or claim 2 and having two central axes in the plane of the deck which are substantially perpendicular relative to each other, each central axis notionally dividing the element in half and wherein the projections and recesses are arranged so that two similar elements will stack in abutting and directly overlying relationship with either central axis of the upper element being substantially parallel with and directly overlying either one of the two central axes of the lower element.

4. An element as claimed in claim 3 in which the projections and recesses of the said one side on a first half of the element as determined by either central axis as selected, are substantially identical in form and disposition to the projections and recesses of the said opposite side on the other half of the element as determined by the selected central axis.

5. An element as claimed in either claim 3 or claim 4 in which said recesses and projections on each of the one and opposite sides of the deck are disposed along notional lines at substantially 45^{o} relative to the central axes.

6. An element as claimed in any one of the preceding claims in which the projections provide a ribbed structure on the sides of the element.

7. An element as claimed in any one of the preceding claims in which the recesses have bottom surfaces which substantially lie in the plane of the deck on the respective sides of the element.

8. An element as claimed in any one of the preceding claims in which, with respect to the projections, the depth of the recesses is less than that of the deck on which the articles are intended to stand on the respective sides of the element.

9. An element as claimed in any one of the preceding claims in which the projections taper as they recede from the deck on their respective sides of the element so that the width of said projections in the horizontal plane decreases and the recesses taper correspondingly to decrease in width as their depth increases.

10. An element as claimed in any one of the preceding claims and of substantially rectangular profile in plan and wherein said projections and recesses are arranged so that two similar elements stack in directly overlying and abutting relationship with their respective projections and recesses engaging and with the four peripheral side edges of the upper elements directly overlying and parallel with the four peripheral side edges of the lower element.

11. An element as claimed in claim 10 and of substantially square profile in plan.

12. An element as claimed in any one of the preceding claims and having substantially circular seatings for the stacking of circularly ended articles such as casks, kegs and similar containers.

13. An element as claimed in any one of the preceding claims and formed as a plastics moulded unit.

14. A spacer element substantially as herein described with reference to the accompanying illustrative drawings.

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NAME	COUNTRY
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EUR-CL (EPC): B65D071/00

US-CL-CURRENT: 108/53.3, 108/55.3 , 108/901

ABSTRACT:

CHG DATE=19990617 STATUS=O> A spacer element, e.g. of moulded plastics, for location between similar overlying articles, e.g. beer kegs 4, in a stack to provide horizontal stability to the stack has a horizontal deck 1 and

seatings
5 on one side on which an upper article 4 in the stack is to stand and seatings
6 on the opposite side which are to rest on lower articles 4 in the stack. The
seatings 5 and 6 are formed by projections 10 and recesses 11 on the deck which
are arranged so that two similar elements can be stacked in directly overlying
and abutting relationship with the downwardly extending projections of the upper element engaging in corresponding recesses of the lower element and
upwardly extending projections of the lower element engaging in corresponding
recesses of the upper element so that said engagement provides horizontal stability in the stack of elements. The projections are preferably inclined at
45 DEG to two central axes of the element and arranged so that two similar
elements can be stacked together either way up and in any one of the four rotational positions between two elements where the peripheral side edges of
the two elements are parallel, so as to minimise effort in stacking.
<IMAGE>